Amendments to the Claims

The listing of claims presented below replaces all prior versions, and listings, of claims in the application.

Listing of claims:

1. (Currently amended) A stepwise method of producing titanium-aluminium compounds and/or titanium-aluminium alloys, comprising a first step of:

reducing an amount of titanium chloride ($TiCl_4$) with an amount of aluminium at a temperature to trigger reactions to form titanium subchloride(s) and aluminium chloride ($AlCl_3$) products;

and then a second step of:

mixing said products, with the addition of more aluminium if required, and heating the mixture in a reaction zone to a temperature above 300C to form $AlCl_3$ in a gas phase, and to produce an end product in the reaction zone of the titanium-aluminium compounds and/or titanium-aluminium alloys.

2. (Original) A method as claimed in claim 1, wherein the method also provides for driving the removal of $AlCl_3$ from the reaction zone to favour a forward reaction in the second step.

3. (Original) A method as claimed in claim 2, wherein the removal of $AlCl_3$ from the reaction zone is continuous.

4. (Previously presented) A method as claimed in claim 1, wherein the first step is conducted at a temperature above the boiling point of $AlCl_3$.

5. (Previously presented) A method as claimed in claim 1, wherein the first step is conducted at a temperature above 200C.

6. (Previously presented) A method as claimed in claim 1, wherein the first step is conducted with an excess amount of aluminium present to reduce all of the titanium chloride ($TiCl_4$) to form said titanium subchloride(s) and aluminium chloride ($AlCl_3$) products.

7. (Previously presented) A method as claimed in claim 1, wherein the second step is conducted at a temperature in the range 300C to 1000C.

8. (Previously presented) A method as claimed in claim 1, comprising the further step of recycling at least some of the aluminium chloride formed, and utilising the aluminium chloride to produce $TiCl_4$.

9. (Original) A method as claimed in claim 8, wherein the aluminium chloride is used to reduce titanium oxide to produce $TiCl_4$.

10. (Original) A method as claimed in claim 9, wherein aluminium oxide is produced by reduction of titanium oxide, and the aluminium oxide is electrolysed to produce aluminium raw material for use in the method of any one of the preceding claims.

11. (Previously presented) A method as claimed in claim 1, wherein the aluminium chloride is condensed away from the reaction zone at a temperature lower than that in the reaction zone.

12. (Previously presented) A method as claimed in claim 1, wherein titanium subchloride which escapes the reaction zone is condensed at a temperature different to that in the reaction zone.

13. (Original) A method as claimed in claim 12, comprising the further step of returning the condensed titanium subchloride to the reaction zone.

14. (Currently amended) A method as claimed in claim 1, also comprising the step of introducing a source of one or more elements selected from the group comprising chromium, niobium, vanadium, zirconium, silicon, boron, molybdenum, tantalum and carbon, and products of said method include titanium-aluminium compounds and/or titanium aluminium alloys which include one or more of these elements.

15. (Original) A method as claimed in claim 14, wherein the source of the element(s) can be a metal halide, a subhalide, a pure element or another compound which includes the element.

16. (Previously presented) A method as claimed in claim 14, wherein the products also include one or more of an intermetallic compound, a titanium-(selected element)-alloy, and intermediate compounds.

17. (Previously presented) A method as claimed in claim 14, wherein the source includes vanadium subchloride, and a product of said method is an alloy or intermetallic complex including titanium, aluminium and vanadium.

18. (Original) A method as claimed in claim 17, comprising the steps of adding the source in appropriate proportions, and carrying out the method to produce Ti-6Al-4V.

19. (Original) A method as claimed in claim 14, wherein the source includes zirconium subchloride, and a product of the method is an alloy or intermetallic complex including titanium, aluminium, zirconium and vanadium.

20. (Previously presented) A method as claimed in claim 14, wherein the source includes niobium halide and chromium halide, and a product of said method is an alloy or intermetallic complex including titanium, aluminium, niobium and chromium.

21. (Original) A method as claimed in claim 20, comprising the step of adding the source in appropriate proportions, and carrying out the method to produce Ti-48Al-2Nb-2Cr.

22. (Previously presented) A method as claimed in claim 1, wherein the aluminium is added in the form of a powder having an approximate upper grain size of less than about 50 micrometres.

23. (Previously presented) A method as claimed in claim 1, wherein the aluminium is in the form of a powder of an approximate upper grain size of greater than about 50 micrometres, and the method comprises the step of milling the aluminium powder and titanium subchloride to reduce the grain size of the aluminium powder in at least one dimension.

24. (Previously presented) A method as claimed in claim 1, wherein the aluminium is in the form of flakes having a thickness in one dimension of less than about 50 micrometres.

25. (Previously presented) A method as claimed in claim 1, wherein the method is conducted in an inert gas atmosphere or in a vacuum.

26. (Previously presented) A method for production of a powder of titanium-

aluminium intermetallic compounds including at least one of Ti_3Al, TiAl and $TiAl_3$, and alloys based on titanium-aluminium intermetallics as claimed in claim 1, wherein starting materials for the method include aluminium powder and titanium chloride.

27. (Currently amended) A method of producing titanium-aluminium compounds and/or titanium-aluminium alloys, comprising a first step of:

heating an amount of titanium chloride ($TiCl_4$) in a plasma of an inert gas and hydrogen mixture, to produce titanium subchloride(s);

and then a second step of:

mixing aluminium with said titanium subchloride(s), and heating the resultant mixture to produce titanium-aluminium compounds and/or titanium-aluminium alloys and $AlCl_3$.

28. (Previously presented) A method as claimed in claim 27, wherein the method also provides for driving the removal of $AlCl_3$ from the reaction zone to favour a forward reaction in the second step.

29. (Currently amended) A stepwise method of producing titanium-aluminium compounds and/or titanium-aluminium alloys, comprising a first step of:

reducing an amount of titanium chloride ($TiCl_4$) with hydrogen in an inert gas atmosphere or in a vacuum, and at a temperature to trigger reactions to form titanium subchloride(s) and aluminium chloride ($AlCl_3$) products;

and then a second step of:

mixing said products with aluminium, and heating the mixture in a reaction zone to a temperature above 300C to form $AlCl_3$ in a gas phase, and to produce an end product in the reaction zone of the titanium-aluminium compounds and/or titanium-aluminium alloys.

30. (Previously presented) A method as claimed in claim 29, wherein the method also provides for driving the removal of $AlCl_3$ from the reaction zone to favour a forward reaction in the second step.

31. (Currently amended) A stepwise method of producing titanium-aluminium compounds and/or titanium-aluminium alloys, comprising a first step of:

heating a mixture of $TiCl_4$ and aluminium to form products $TiCl_3$ and $AlCl_3$, at a temperature less than 300C;

and then a second step of:

mixing said products, with the addition of more aluminium if required, and heating the mixture to a reaction zone temperature above 300C to cause $AlCl_3$ to be evaporated from the reaction zone and to form titanium-aluminium compounds and/or titanium-aluminium alloys.

32. (Previously presented) A method as claimed in claim 31, wherein the method also provides for driving the removal of $AlCl_3$ from the reaction zone to favour a forward reaction in the second step.

33. (Original) A stepwise method of producing a metal-aluminium compound, comprising the first step of:

adding a reducing agent to reduce an amount of a metal halide to form metal subhalide(s);

and the second step of:

mixing said metal subhalide(s) with aluminium, and heating the mixture in a reaction zone to a temperature above 300C to form aluminium halides in a gas phase, and to produce an end product in the reaction zone comprising a metal compound containing a percentage of aluminium.

34. (Original) A method in accordance with claim 33, wherein the reducing agent is selected from the group comprising zinc, magnesium, sodium, aluminium or other like metals.

35. (Previously presented) A method as claimed in claim 33, wherein the method also provides for driving the removal of aluminium halides from the reaction zone to favour a forward reaction in the second step.

36. (Previously presented) A method as claimed in claim 1, comprising the further step of adding a reagent to a product of the method to produce a further product.

37. (Original) A method for the production of vanadium and/or vanadium compounds, comprising the steps of mixing aluminium with a precursor material including vanadium subhalide, and heating the mixture, to form aluminium halides and vanadium and/or vanadium compounds.

38. (Original) A method in accordance with claim 37, wherein the vanadium compounds may include vanadium-aluminium alloys and/or vanadium aluminium intermetallic complexes.

39. (Original) A method for the production of zirconium and/or zirconium compounds, comprising the steps of mixing aluminium with a precursor material including zirconium subhalide, and heating the mixture, to form aluminium halides and zirconium and/or zirconium compounds.

40. (Currently amended) A method in accordance with claim [[38]] 39, wherein the zirconium compounds may include zirconium-aluminium alloys and/or zirconium-aluminium intermetallic complexes.

41. – 44. (Cancelled)

45. (Previously presented) A titanium compound, a metal compound or a product produced by the method as claimed in claim 1.

46. (Previously presented) A method as claimed in claim 27, wherein the first step is conducted at a temperature above the boiling point of $AlCl_3$.

47. (Currently amended) [[a]] A method as claimed in claim 27, wherein the first step is conducted at a temperature above 200C.

48. (Previously presented) A method as claimed in claim 27, wherein the second step is conducted at a temperature in the range of 300C to 1000C.

49. (Previously presented) A method as claimed in claim 29, wherein the first step is conducted at a temperature above the boiling point of $AlCl_3$.

50. (Previously presented) A method as claimed in claim 29, wherein the first step is conducted at a temperature above 200C.

51. (Previously presented) A method as claimed in claim 29, wherein the second step is conducted at a temperature in the range of 300C to 1000C.

52. (Previously presented) A method as claimed in claim 31, wherein the first step is conducted at a temperature above the boiling point of $AlCl_3$.

53. (Previously presented) A method as claimed in claim 31, wherein the first step is conducted at a temperature above 200C.

54. (Currently amended) [[a]] A method as claimed in claim 31, wherein the first step is conducted with an excess amount of aluminium present to reduce all of the titanium chloride ($TiCl_4$) to form said $TiCl_3$ and aluminium chloride ($AlCl_3$) products.

55. (Currently amended) [[a]] A method as claimed in claim 31, wherein the second step is conducted at a temperature in the range of 300C to 1000C.

56. (Previously presented) A method as claimed in claim 33, wherein the first step is conducted at a temperature above the boiling point of $AlCl_3$.

57. (Previously presented) A method as claimed in claim 33, wherein the first step is conducted at a temperature above 200C.

58. (Previously presented) A method as claimed in claim 33, wherein the first step is conducted with an excess amount of reducing agent present to reduce all of the metal halide to form said metal subhalide(s).

59. (Previously presented) A method as claimed in claim 33, wherein the second step is conducted at a temperature in the range of 300C to 1000C.

60. (Previously presented) A titanium compound, a metal compound or a product produced by the method as claimed in claim 27.

61. (Previously presented) A titanium compound, a metal compound or a product produced by the method as claimed in claim 29.

62. (Previously presented) A titanium compound, a metal compound or a product produced by the method as claimed in claim 31.

63. (Previously presented) A titanium compound, a metal compound or a product produced by the method as claimed in claim 33.